

Florida's Gulf Reef Fish Survey

MRIP Certification Review Documentation

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Effort Mail Survey Conference Call

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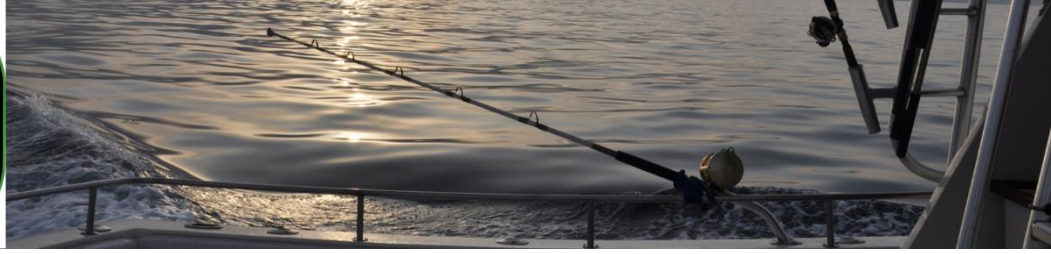
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Florida's Gulf Reef Fish Survey

Section 1: Angler Registry

Anglers 16 years of age and older fishing from private recreational boats off the west coast of Florida (excluding Monroe County) are required to register for the Gulf Reef Fish Survey (GRFS) to recreationally harvest certain reef fish species in the Gulf of Mexico (Rule text provided in Box A). This requirement is in addition to all applicable state saltwater fishing license requirements and state or federal size and bag limits, harvest seasons, and other regulatory requirements. Registration is required to legally harvest 10 species in the reef fish complex, including: red snapper; vermilion snapper; gray triggerfish; gag, red and black groupers; and amberjacks (including greater and lesser amberjacks, almaco jack, and banded rudderfish).

There is no cost associated with registration, and Legislative authority would be required prior to imposing a fee. Anglers are registered for the Gulf Reef Fish Survey through the state fishing licensing system during the purchase or renewal of a saltwater fishing license for no additional fee (see screenshot of free option in Figure 1), or as a separate and free transaction if no license was purchased (for more information: <http://myfwc.com/fishing/saltwater/recreational/gulf-reef-fish-survey/>). Transactions were initiated by individual customers applying online, over the phone, at a local tax collectors' office, or at any approved state fishing license vendor. During a transaction through the state fishing license system, anglers are required to provide a driver's license number or other state issued identification, which is used to confirm residency status (in-state or out-of-state) and automatically populate the database with the customer's current mailing address of legal record. Customers are also given the option to provide an email address.

Once anglers are registered for the Gulf Reef Fish Survey, they are eligible 12 months from that date to be contacted by mail and/or email (if provided) for the purpose of data collection. Registration for the Gulf Reef Fish Angler designation must be renewed on an annual basis for continued participation in the fishery. The Gulf Reef Fish Angler designation expiration date is not synched with the valid saltwater fishing license expiration date; this has implications for how persons are included in the mail survey sample frame (discussed in Section 2).

Reporting Requirement and Enforcement

Once an angler has registered their intent to harvest reef fish species by signing up for the Gulf Reef Fish Survey, there are no further reporting requirements. Individuals who are selected for the mail survey may choose not to complete and return the questionnaire without penalty. However, civil penalties do apply if a person is found in possession of Gulf Reef Fish species and has failed to sign up for the survey prior to attempted harvest. Enforcement of the sign up requirement for the Gulf Reef Fish Survey is

conducted by FWC officers in the field, who may request proof of registration during routine inspections of vessels and landed catch. Civil penalties that apply are described Appendix A and include \$50 for the first offense and incrementally higher fines for repeat offenses within 36 months.

Box A: 68B-14.009 Reporting Requirement.

The purpose and intent of this rule is to improve recreational harvest data collection capabilities for certain reef fish species by identifying the population of anglers fishing for these species.

(1) From April 1, 2015 through June 30, 2020, recreational harvesters are required to report their intention to harvest or attempt to harvest certain reef fish species in the upcoming year. A recreational harvester may not harvest, attempt to harvest, or possess red snapper, vermilion snapper, gag grouper, red grouper, black grouper, gray triggerfish, greater amberjack, lesser amberjack, banded rudderfish, or almaco jack while aboard a vessel in or on Florida Waters of the Gulf of Mexico excluding Monroe County, unless that person has reported their intention to do so to the Gulf Reef Fish Survey. Under Section 379.401(1), F.S.¹, failure to file reports required of persons who hold recreational licenses is a non-criminal infraction.

(2) Proof of submission of the report required in subsection (1) must be in the personal possession of the recreational harvester while the recreational harvester is harvesting, attempting to harvest or possessing these species aboard a vessel in Florida Waters of the Gulf of Mexico excluding Monroe County.

(3) Persons meeting the criteria outlined in paragraphs 379.353(2)(a), (i), (j), and (o), F.S.¹ are exempt from the reporting requirement.

Rulemaking Authority Art. IV, Sec. 9, Fla. Const. Law Implemented Art. IV, Sec. 9, Fla. Const. History—New 8-26-14.

Section 2: Private Boat Effort Survey

Methods

Mail Survey Design

Each month, anglers with a current subscription to the GRFS are eligible to receive a questionnaire mailed to their physical address to report their fishing activity over the most recent fishing month. Once an individual is selected, they are marked as ineligible for three months to minimize potential survey fatigue. Prior to drawing a sample for the fishing effort mail survey, subscribers to the GRFS are grouped into categories based on expected levels of participation in the recreational reef fish fishery. For example, subscribers that do not live near the Gulf coast or have direct access to a registered boat may be less likely to participate in the reef fish fishery in the Gulf of Mexico, and may also be less likely to respond to the voluntary survey (avidity bias). By surveying homogenous groups separately, potential bias from varied survey response rates is partitioned and may be better accounted for, and participation rates within each group may also be measured more precisely. Stratification also accounts for regional variability that may influence participation rates. For example, fishing effort may vary regionally in response to different seasonal openings and closures for red snapper, which are more abundant in

northern region, versus gag grouper, which are more abundant off the central and southern coast of Florida.

The mail survey is stratified by 14 separate survey groups (Table 1). Non-Florida residents are included in one of two possible strata based on their state of residence: 1) states adjacent to Florida, including Georgia and Alabama, and 2) all other states. Florida residents are divided into four main regions based on their county of residence (Table 1), and may be further divided into sub-regions based on whether the county of residence is coastal (adjacent to the Gulf coast for the purpose of this survey) or non-coastal (inland or adjacent to the Atlantic coast). In the northwestern region (NW), all counties are considered coastal; the Big Bend (BB) and southwest (SW) regions are sub-divided into coastal and non-coastal sub-regions; and all counties in the Keys and Southeast Florida region (KY) are considered non-coastal (since registration for the survey is not required when fishing adjacent to Monroe County). Within each region and sub-region, Florida residents are further sub-divided based on whether a recreational boat is registered to their household. Florida residents subscribed to the GRFS are matched by driver license number with an in-state vessel registration database obtained from the Florida Department of Highway Safety and Motor Vehicles.

At the beginning of each new month, 10% or up to 500 individuals (whichever is less) of registered participants from each stratum listed in Table 1 are selected to receive a paper questionnaire (Appendix B) delivered to their mailing address on record. A cover letter (Appendix C) explaining the purpose of the survey is included with the questionnaire, as well as a return envelope that is self-addressed with postage paid on delivery. Respondents are instructed to only report fishing activity for the previous month, and only for the person whose name is printed on the survey questionnaire. The respondent is asked to report specific dates for all recreational fishing trips taken from a private recreational boat in the Gulf of Mexico by marking date on a calendar for the survey month provided on the questionnaire. Respondents are then asked to provide specific details for up to twelve trips. A map is provided on the questionnaire to assist with reporting the general zone where each trip took place (Figure 1). For each reported trip, the respondent is asked to recall the percent of time (if any) spent fishing greater than 10 miles from shore (in the EEZ), and to select from a list of reef fishes that were targeted or caught (if any) during each trip. A guide with pictures for each Gulf reef fish species is included in the survey packet (Appendix D) to aid with positive identification. Two weeks after questionnaires are mailed, a reminder postcard (Appendix E) is mailed to all selected households to prompt a timely response. Two weeks after the reminder is mailed, a second questionnaire is mailed to households that have not yet returned the first survey to prompt them again for a response. Response to the mail survey is voluntary.

Determining Eligibility for the Mail Survey

An individual is included in the sample frame for the mail survey during a given month if they signed up for the Gulf Reef Fish Survey and their subscription was valid during any portion of the reporting month (one or more days). In May 2017, it was discovered that a growing portion of individuals included in the GRFS sample frame each month did not have a valid saltwater fishing license that permitted them to participate in a saltwater fishing trip. Initially, this was attributed to resident senior citizens who are exempt from the saltwater fishing license requirement but must still subscribe to the GRFS. However, as the number of non-licensed GRFS subscriptions continued to increase, it became apparent that the sample frame extracted from the state's license database also included individuals with a valid GRFS

subscription whose saltwater license had expired. For example, when the new GRFS designation was required in April 2015 to harvest certain reef fishes, a person was allowed to separately sign up for the survey in 2015 without having to purchase a new license (if they already had one), and their subscription remained valid in the state's license database for 12 months from the date the person signed up for the survey, even if the saltwater fishing license was allowed to expire (one year from the date of purchase in 2014). Hence, anglers were included in the sample frame when they no longer possessed a valid saltwater fishing license. Unsynchronized expiration dates for the saltwater fishing license and GRFS subscription will continue to be an issue, since anglers who purchase a current saltwater fishing license may elect to add the GRFS designation at a later date. The annual renewal requirement for the GRFS subscription also creates issues for the field intercept survey, which will be discussed further in the next section. To account for anglers who should have been excluded from the GRFS frame and sample draws due to a lapse in renewal of their saltwater license, these records were retroactively flagged in the original files used to run the sample draws during survey months prior to May 2017. Survey responses received from any expired license holders were also flagged. Using the methods described below, fishing effort estimates for each survey month were calculated with all flagged records excluded. Starting with the May 2017 survey month, GRFS subscribers with expired licenses will be removed from the sample frame and will no longer be eligible for the survey.

Effort Estimation

The following methods are used to generate estimates of the number of Gulf reef fish trips made by registered participants during a given month. The sample selection weight for individuals selected to receive a survey from a given stratum (h) is calculated as:

$$SW_h = \frac{N_h}{n_h} \quad (1)$$

Where N_h is the total number of registered Gulf reef fish anglers in the stratum, and n_h is the number of individuals selected from the stratum to receive the mail survey. To account for individuals that did not respond to a request to return the completed survey questionnaire, the survey response rate in each stratum is calculated as:

$$R_h = \frac{\sum_{i=1}^{n_h} SW_h r_{h,i}}{\sum_{i=1}^{n_h} SW_h} \quad (2)$$

where r_i is the binomial variable indicating whether selected individual i responded to the survey (1=yes, 0=no). The response rate is used to calculate a secondary weight for non-response as:

$$NRW_h = \frac{1}{R_h} \quad (3)$$

The weighted mean number of Gulf reef fish trips per response in each stratum is calculated as:

$$\bar{y}_h = \frac{\sum_{j=1}^{n_{h,j}} SW_h NRW_h y_{h,j}}{\sum_{j=1}^{n_{h,j}} SW_h NRW_h} \quad (4)$$

Where $y_{h,j}$ is the number of Gulf reef fish trips reported in state or federal waters by the jth respondent in stratum h, and $n_{h,j}$ is the number of people in stratum h that responded to the survey out of n_h selected. Variance is calculated as:

$$s_h^2 = \frac{\sum_{j=1}^{n_{h,j}} (y_{h,j} - \bar{y}_h)^2}{n_{h,j} - 1} \quad (5)$$

The overall mean weighted number of Gulf reef fish trips per response across all 14 strata is calculated as:

$$\bar{y} = \frac{\sum_{h=1}^{14} \sum_{j=1}^{n_{h,j}} SW_h NRW_h y_{h,j}}{\sum_{h=1}^{14} \sum_{j=1}^{n_{h,j}} SW_h NRW_h} \quad (6)$$

And overall variance is calculated as:

$$s^2(\bar{y}) = \sum_{h=1}^{14} \frac{(SW_h NRW_h)^2 s_h^2}{n_{h,j}} - \sum_{h=1}^{14} \frac{SW_h NRW_h s_h^2}{N} \quad (7)$$

The total, unadjusted number of Gulf reef fish trips taken by all anglers registered for the Gulf Reef Fish Survey during a given month is calculated as:

$$\hat{Y} = N \bar{y} \quad (8)$$

where N is the total number of Gulf reef fish anglers that were registered during the survey month. Since N is constant, variance is calculated as:

$$s^2(\hat{Y}) = (N * s(\bar{y}))^2 \quad (9)$$

An adjustment for off-frame anglers (anglers that participated in the fishery but did not register for the Gulf Reef Fish Survey) is calculated separately using data collected from a supplemental Intercept survey of fishing parties from private recreational boats (described in the next section). The ratio is calculated as the total number of reef fish anglers from all fishing parties intercepted that could be verified as either subscribed or not subscribed to the GRFS, divided by total that were verified as subscribed. The mean weighted ratio (\hat{R}) and variance is generated by area fished (state and federal waters) using the survey means procedure in SAS:

```
proc surveymeans data=grfs_trip mean var;
strata strat_id;          *strata=year||month||kind_of_day||time_interval;
cluster psu_id;           *cluster=assignment id;
weight w_int_grfs;        *weight=assignment sample weight;
domain domvars;          *domain=year||month||area_fished;
ratio anglers / registered;
*ratio( $\hat{R}$ )=sum anglers verified for GRFS status / sum verified GRFS subscribers;
run;
```

Total effort (expressed as reef fish angler trips) in a given domain (month and area fished) is estimated as:

$$\hat{T} = (\hat{Y} * \hat{R}) \quad (10)$$

Variance was calculated using Goodman's product:

$$s^2(\hat{T}) = \hat{Y}^2 s^2(\hat{R}) + \hat{R}^2 s^2(\hat{Y}) - s^2(\hat{Y}) s^2(\hat{R}) \quad (11)$$

Evaluating Oversubscription

To evaluate the magnitude of oversubscription and potential non-response bias, FWC initiated a new procedure during the last quarter of 2016 to conduct a short survey with new or recently renewed registrants in the Gulf Reef Fish Survey to characterize their likelihood to participate in the Gulf reef fish fishery over the coming year that they are eligible to receive the mail survey. Each month, new registrants to the Gulf Reef Fish Survey are identified, and those who provided a valid e-mail address during the purchase of their saltwater license receive an email inviting them to participate in a short survey to determine their anticipated level of participation in the Gulf reef fish recreational fishery over the coming year. The three questions that are asked during this initial survey are:

1. In the past 12 months, did you recreationally fish at least once from a private boat that departed from the western (Gulf) coast of Florida (excluding Monroe County)?
2. In the next 12 months, how likely are you to recreationally fish on a private boat off the western (Gulf) coast of Florida (excluding Monroe County)?
3. Whenever you recreationally fish from a private boat, do you attempt to harvest any of the following types of reef fish?
4. Do you have any comments, questions, or concerns?

Those who do not provide an email address receive a post-card mailed to their residential address that contains the same three questions (Figure 2). Respondents may simply tear off the portion of the post card that includes the questionnaire and return it to FWC free of charge (postage paid on receipt).

Results

Survey Frame and Sample Size

Registration for the Gulf Reef Fish survey was required by April 2015, and May was the first fishing month that the mail survey was initiated for in 2015. The first full year the monthly mail survey was conducted was 2016. The numbers of anglers that were registered for the Gulf Reef Fish Survey increased each month during 2015, and leveled off at just over 400,000 subscribers by the end of 2016 (Figure 3 and Table 2).

Each month on average, a total of 6,140 individuals were selected to receive an effort survey questionnaire in the mail, and the percentage that returned the survey back to FWC ranged from 17.5% to 26.5% (average = 21.6% in 2015 and 18.4% in 2016; Table 2). The numbers of anglers in each stratum that were registered for the Gulf Reef Fish Survey during a single month (June) during 2016 are provided in Table 3. The highest percentage of registered anglers were from households in the SW region (31.9%), followed by the Big Bend region (26.2%), out-of-state (24.2%), Northwest region (12.3%), and Keys or Southeast Florida (5.4%; Table 3). A small percentage (0.9%) of registered anglers could not be assigned to a stratum due to an incomplete address or an address that was outside the U.S. Within each Florida region, the highest percentage of registered anglers were from households without a registered boat (Figure 4). However, anglers that lived in a household with a registered boat were more likely to respond to the survey, and were also more likely to participate in a Gulf Reef Fish trip during the month surveyed (Figure 5). Anglers that live in coastal counties are also more likely to respond and participate in the fishery, compared to those who live in non-coastal counties (Figure 5). These results demonstrate the

necessity of the stratified survey design, but also raise concerns about the numbers of anglers registered for the Gulf Reef Fish Survey who potentially never participate in the fishery. Oversubscription by non-participants in the fishery is an issue for two reasons: 1) it increases the cost of the survey if a large proportion of registered anglers do not need to be included in the population that is being sampled, and 2) it potentially introduces a bias in estimates of fishing effort if over-subscribers are more or less likely to respond to the survey than anglers that actually participate in reef fish trips. Results presented in Figures 4 and 5 indicate that there is a potential bias that should be measured and accounted for, given that a large portion of registered anglers do not live near the Gulf coast, are less likely to respond to the Gulf Reef Fish Survey, and report taking fewer trips than anglers from coastal households.

Estimated Angler Trips

Survey responses were used to estimate the total numbers of Gulf Reef Fish trips taken in state and federal waters by registered anglers across all strata each month during 2016 (Figure 6). The adjustment factor for Gulf reef fish anglers that were not subscribed to the mail survey was <2.0 during most months, and ranged as high as 5.78 during one month when reported fishing activity was low (Table 4). Total adjusted fishing effort peaked during summer months (June, July, August) and coincides with open seasons for many highly targeted Gulf reef fish species (Table 5).

Evaluation of Oversubscription

Among new GRFS subscribers that were administered the avidity survey during October through December of 2016, the overall response rate was 10.5% for those who received the email invitation and 17.8% for those who received the post-card mailer (Table 6). Overall, 56% of respondents were 'Very unlikely' to take a GRFS trip, 33% were 'Very likely', and 11% would 'Maybe' take a GRFS trip in the 12 months after obtaining the Gulf Reef Fish Angler designation (Figure 8). A higher proportion of respondents to the email survey were likely to participate in a trip; whereas, a higher proportion of respondents to the postcard survey were unlikely (Figure 8). Respondents who obtained the Gulf Reef Angler designation online were also more likely to take a GRFS trip in the next 12 months; compared to those who obtained the endorsement via other methods (such as at a retail store or county tax collectors' office; Figure 9). This is likely a reflection of some vendors or tax collectors not asking anglers whether they should be signed up for the GRFS and making the selection on their behalf; whereas, online customers must choose for themselves. The likelihood of participating in the fishery also varied among respondents in different strata. A majority of respondents from non-coastal counties and households without a registered boat were very unlikely to fish for reef fish in the Gulf; whereas, coastal residents and boat owners were more likely to participate in the fishery (Figure 10).

Table 1. Mail survey strata, defined by residence of GRFS registrants.

Stratum	Region	Sub-region	Boat registration
110	NW (FL panhandle)	Coastal	No
111	NW (FL panhandle)	Coastal	Yes
200	BB (FL Big Bend)	Non-coastal	No
201	BB (FL Big Bend)	Non-coastal	Yes
210	BB (FL Big Bend)	Coastal	No
211	SW (FL peninsula)	Coastal	Yes
300	SW (FL peninsula)	Non-coastal	No
301	SW (FL peninsula)	Non-coastal	Yes
310	SW (FL peninsula)	Coastal	No
311	SW (FL peninsula)	Coastal	Yes
400	KY (Keys and SE FL)	Non-coastal	No
401	KY (Keys and SE FL)	Non-coastal	Yes
500	AL/GA (nearby states)	Non-coastal	na
600	Other states	Non-coastal	na

Table 2. Total numbers of individuals registered for the Gulf Reef Fish Survey, sample sizes, and numbers of response rates by survey month and year.

Year	Survey month	Number registered	Sample size	Number responses	Percent responses
2015	May	246,280	5,909	1,566	26.5
	June	289,032	6,320	1,347	21.3
	July	332,682	6,453	1,378	21.4
	August	325,129	6,286	1,273	20.3
	September	326,919	6,022	1,221	20.3
	October	335,082	6,065	1,196	19.7
	November	337,690	6,104	1,296	21.2
	December	346,704	6,128	1,347	22.0
2016	January	327,372	6,115	1,184	19.4
	February	359,101	6,105	1,205	19.7
	March	380,078	6,141	1,223	19.9
	April	386,970	6,132	1,141	18.6
	May	402,161	6,212	1,170	18.8
	June	412,084	6,184	1,120	18.1
	July	431,712	6,204	1,073	17.3
	August	410,066	6,151	1,088	17.7
	September	407,233	6,159	1,064	17.3
	October	405,002	6,159	1,112	18.1
	November	405,451	6,116	1,151	18.8
	December	401,418	5,835	1,021	17.5

Table 3. Individuals registered for the Gulf Reef Fish Survey in each strata and sample sizes for the June 2016 survey month.

Region	Sub-region	Boat status	Number registered	Percent of population	Sample size	Percent that responded
NW	Coastal	Boat	7,631	1.8	477	21.6
		No boat	43,205	10.4	470	13.6
BB	Coastal	Boat	5,389	1.3	471	20.8
		No boat	27,006	6.5	475	14.3
	Non-coastal	Boat	11,364	2.7	482	21.6
		No boat	64,311	15.5	470	15.1
SW	Coastal	Boat	12,513	3.0	479	23.8
		No boat	70,819	17.0	474	17.9
	Non-coastal	Boat	7,067	1.7	481	20.0
		No boat	40,867	9.8	485	10.9
KY	Non-coastal	Boat	2,850	0.7	282	15.2
		No boat	19,329	4.7	489	6.3
Non-FL	AL/GA	-	31,031	7.5	357	25.2
	Other states	-	68,702	16.5	292	34.2
Other	-	-	3,544	0.9	0	0
TOTAL			415,628		6,184	17.1

Table 4. Estimated angler trips taken by anglers registered for the Gulf Reef Fish Survey (unadjusted angler trips), ratio of total reef fish anglers to registered anglers intercepted in the field (ratio), total estimated fishing effort (total angler trips) adjusted for unregistered angler trips, and coefficient of variation (c.v.) for total estimated effort.

Area	Year	Month	Unadjusted angler trips	Variance (unadj. trips)	Ratio	Variance (ratio)	Total angler trips	c.v.
EEZ	2015	May	20,409	983	1.79	0.04	36,597	0.11
		Jun	47,620	6,166	1.79	0.04	85,391	0.11
		Jul	35,478	5,213	1.72	0.10	60,877	0.18
		Aug	22,838	1,960	2.04	0.23	46,521	0.24
		Sep	30,222	5,071	1.82	0.05	55,052	0.12
		Oct	20,331	1,833	1.74	0.34	35,299	0.34
		Nov	24,040	10,451	1.74	0.25	41,765	0.29
		Dec	8,045	495	5.78	1.14	46,491	0.18
	2016	Jan	12,958	1,610	1.50	0.01	19,436	0.06
		Feb	20,352	8,659	2.22	0.05	45,210	0.11
		Mar	17,106	3,353	1.89	0.06	32,306	0.13
		Apr	39,907	9,193	1.93	0.04	77,001	0.11
		May	21,856	2,532	1.37	0.03	29,952	0.13
		Jun	45,806	13,621	1.22	0.00	56,101	0.04
		Jul	38,686	9,093	1.29	0.02	50,064	0.12
		Aug	29,820	9,425	1.41	0.04	42,083	0.14
		Sep	16,392	2,517	1.22	0.01	20,061	0.07
		Oct	14,909	3,885	1.83	0.14	27,221	0.21
		Nov	15,868	2,611	1.51	0.06	24,037	0.16
		Dec	33,892	25,168	1.43	0.02	48,316	0.09
State	2015	May	38,242	2,237	1.75	0.03	67,027	0.11
		Jun	50,838	7,076	1.75	0.03	89,104	0.11
		Jul	52,490	6,703	1.42	0.11	74,273	0.23
		Aug	40,837	6,995	2.49	0.18	101,703	0.17
		Sep	47,591	13,261	1.72	0.01	81,863	0.07
		Oct	53,992	14,406	1.53	0.03	82,395	0.11
		Nov	41,741	18,310	2.72	0.60	113,667	0.29
		Dec	19,569	9,913	1.88	0.64	36,762	0.43
	2016	Jan	35,964	14,050	1.38	0.03	49,700	0.13
		Feb	30,064	12,806	1.37	0.16	41,208	0.29
		Mar	49,612	26,866	1.72	0.37	85,204	0.35
		Apr	42,456	12,040	1.41	0.00	59,942	0.03
		May	67,892	16,163	1.57	0.06	106,362	0.16
		Jun	92,548	39,582	1.30	0.02	120,077	0.10
		Jul	56,930	19,043	2.35	0.24	134,068	0.21
		Aug	52,428	43,279	2.32	0.61	121,372	0.34
		Sep	55,625	16,388	1.30	0.01	72,452	0.09
		Oct	48,900	12,559	1.58	0.02	77,025	0.10
		Nov	43,368	9,303	1.47	0.01	63,870	0.08
		Dec	33,080	13,600	2.35	0.22	77,851	0.20

Table 5. Months when recreational harvest was closed entirely (gray), or open at least some portion in state and/or federal waters (white) for highly targeted Gulf reef fishes, including: RS=red snapper; VS=vermilion snapper; GTF=gray triggerfish; Gag=gag grouper; RG=red grouper; GAJ=greater amberjack.

Year	Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2015	RS												
	VS												
	GTF												
	Gag												
	RG												
	GAJ												
2015	RS												
	VS												
	GTF												
	Gag												
	RG												
	GAJ												

Table 6. The number of initial surveys mailed to new or renewed Gulf Reef Fish Survey subscribers by month, the number of responses, and the response rate.

Method	Survey month	Number of surveys mailed	Number of responses	Percent response
Self-mailer postcard	October	8,767	846	9.6
	November	9,089	969	10.7
	December	8,130	914	11.2
Email with link to Survey Monkey	October	7,082	1,274	18.0
	November	8,141	1,309	16.1
	December	7,879	1,534	19.5

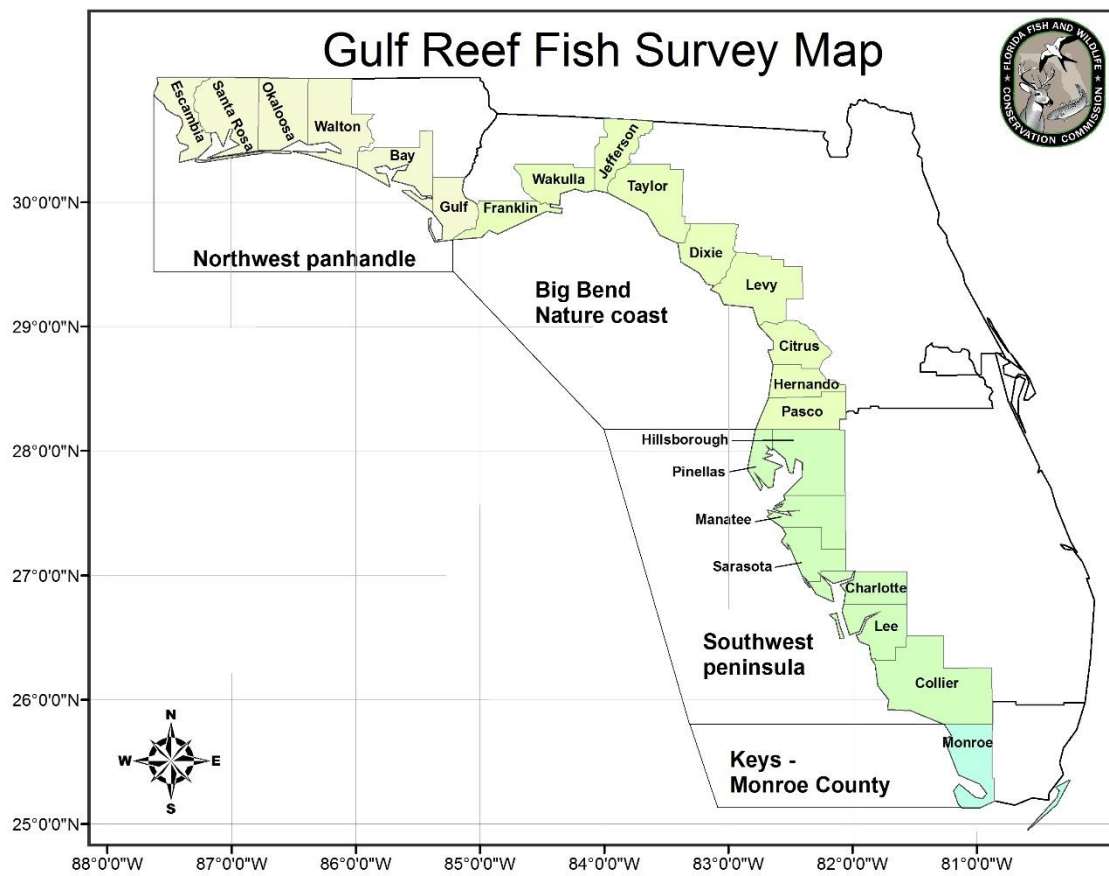


Figure 1. Map provided to survey recipients to assist in determining the region from which their boat departed.

TAXPAYER FUNDS WERE NOT USED TO PRODUCE OR MAIL THIS SURVEY



Help Us Improve Our Survey...

*In an effort to better serve Florida's recreational anglers, please answer a few questions for us. **Once complete, please tear off this portion of the mailer and return to our office to help streamline our survey efforts.***

In the past 12 months, did you recreationally fish at least once from a private boat that departed from the western (Gulf) coast of Florida (excluding Monroe County)?

☐ Yes ☐ No ☐ Not Sure/Do Not Recall

In the next 12 months, how likely are you to recreationally fish on a private boat off the western (Gulf) coast of Florida (excluding Monroe County)?

☐ Very likely ☐ Maybe/ Not Sure ☐ Very unlikely ☐ I never fish on the west coast of Florida

Whenever you recreationally fish from a private boat, do you attempt to harvest any of the following types of reef fish?

☐ Red snapper ☐ Gag grouper, red grouper, black grouper
☐ Vermilion snapper ☐ Amberjack, almaco jack, banded rudderfish
☐ Gray triggerfish ☐ I never attempt to harvest any of these species

Figure 2. Post-card questionnaire mailed to new GRFS subscribers in late 2016.

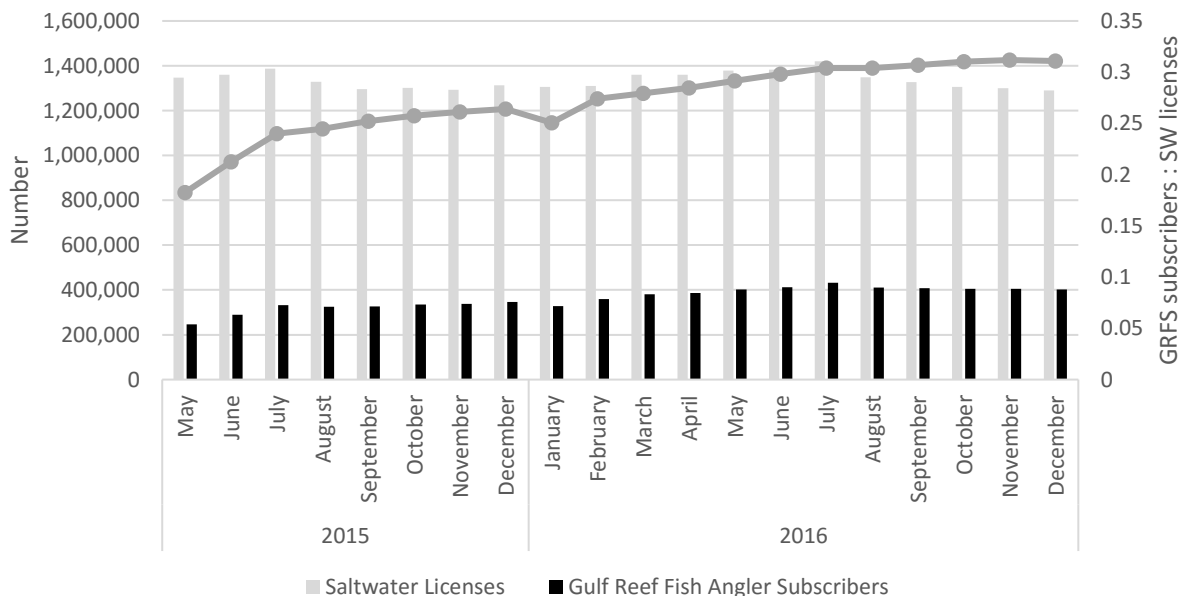


Figure 3. Total number of valid saltwater fishing licenses and subscribers to the Gulf Reef Fish Survey, and ratio of GRFS subscribers to saltwater fishing licenses each month (gray line).

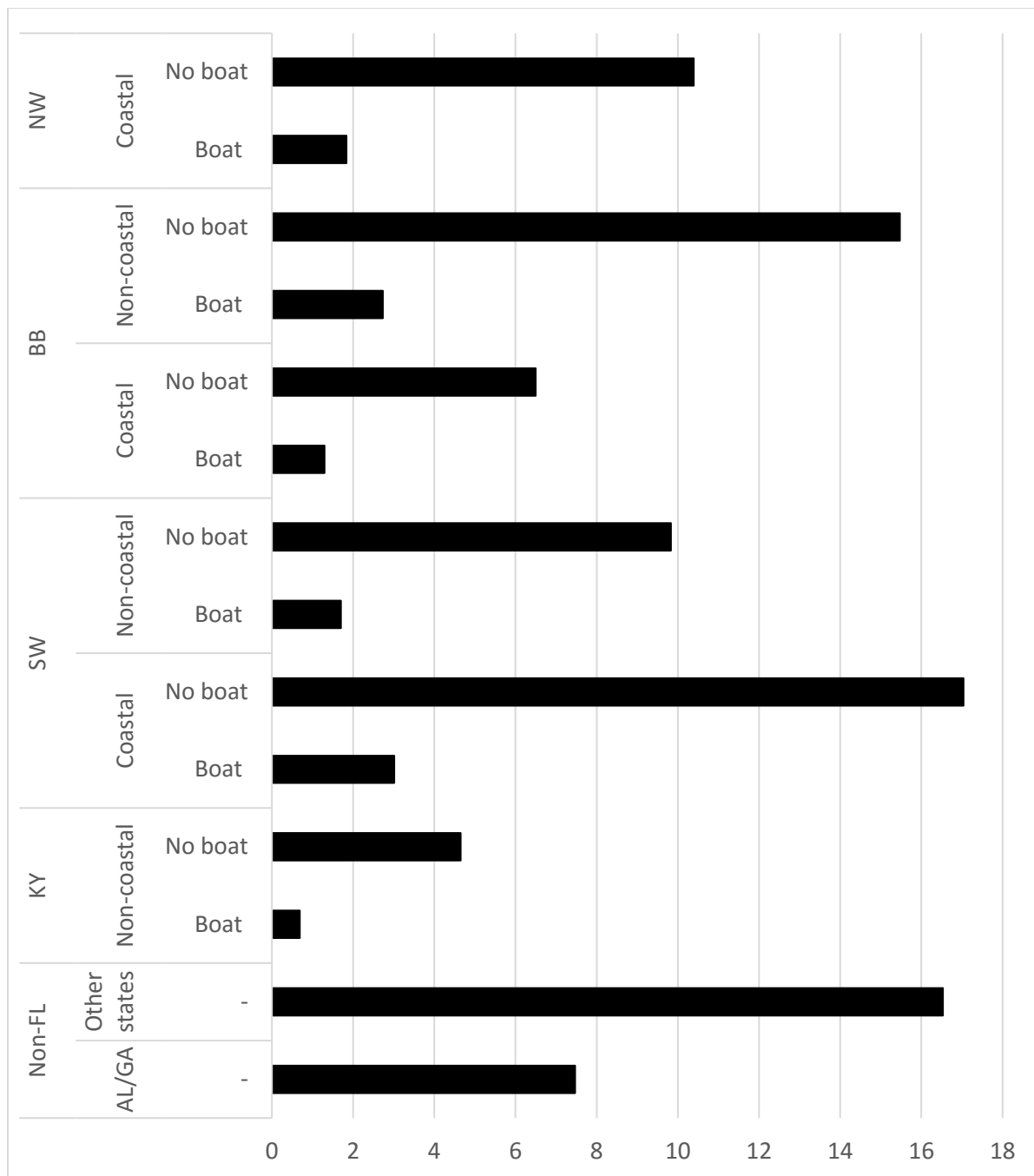


Figure 4. Percent of anglers registered for the Gulf Reef Fish Survey in each stratum during June 2016.

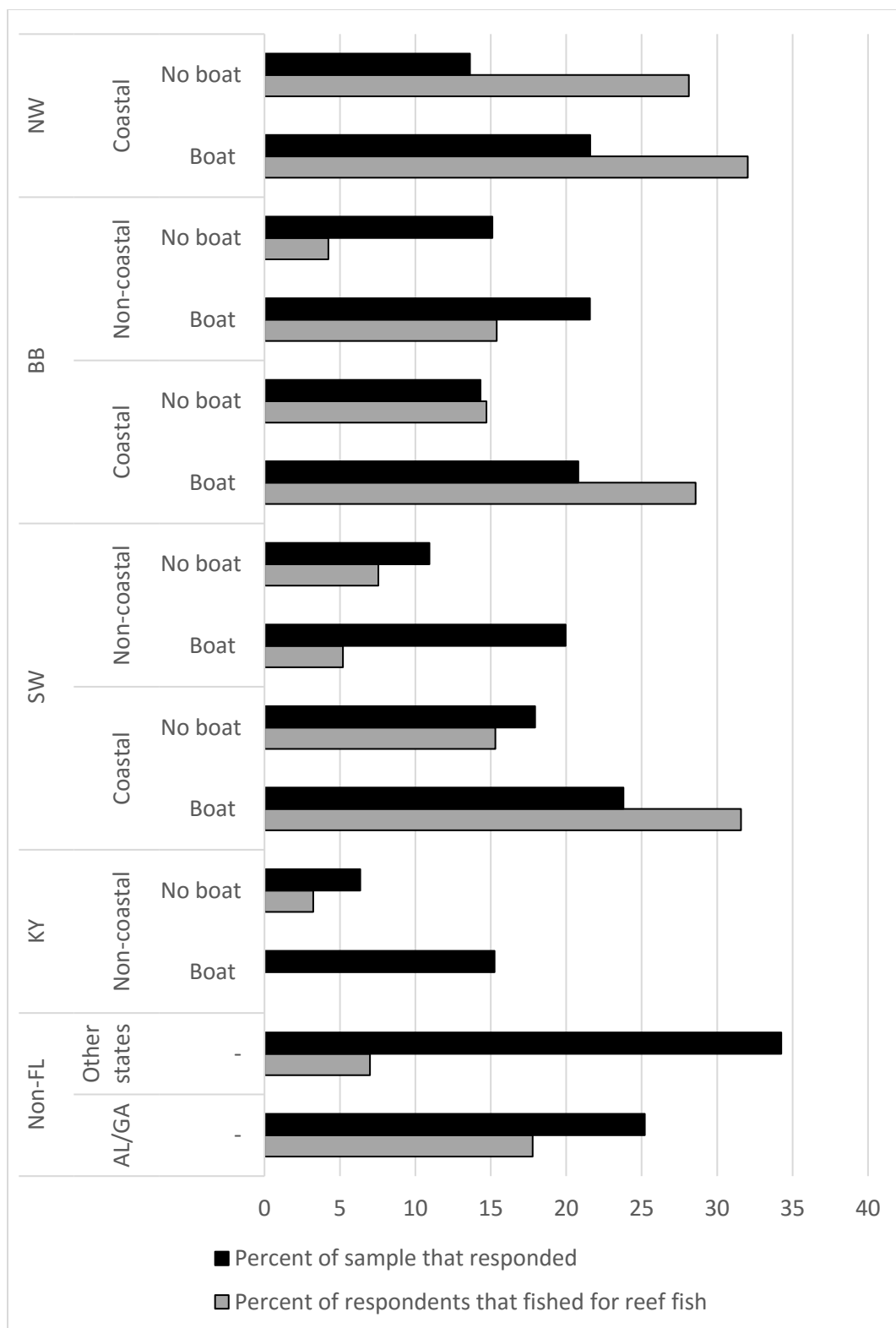


Figure 5. Percentage by strata of the sampled anglers who responded (black bars) and the percentage of those respondents who fished for reef fish during at least one trip (gray bars) in June 2016.

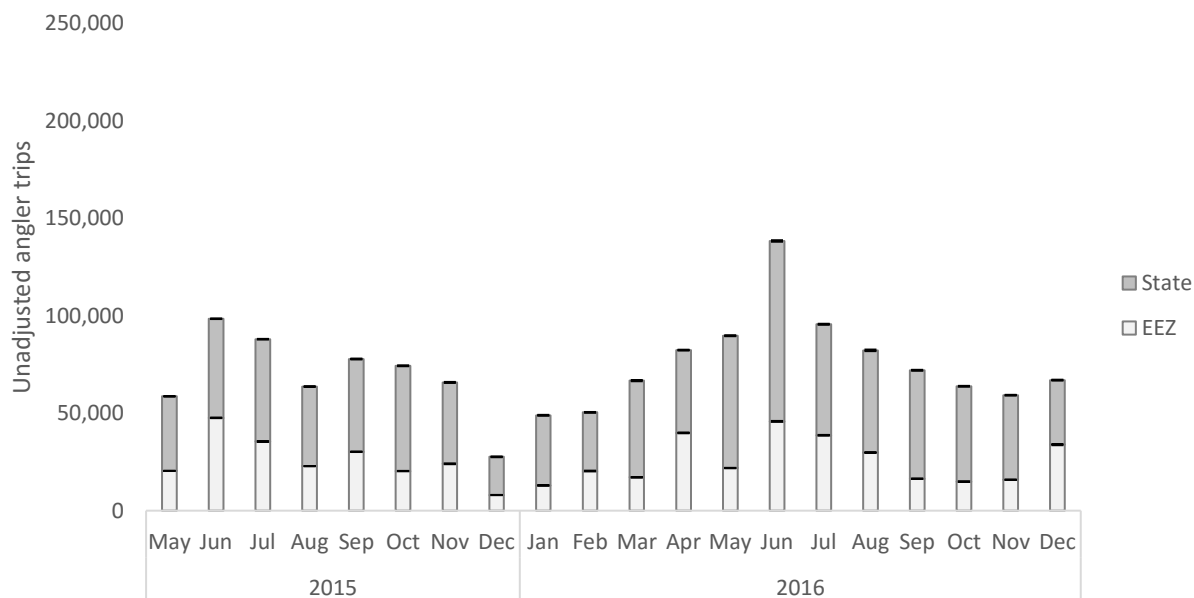


Figure 6. Estimated numbers of reef fish trips taken by anglers registered for the Gulf Reef Fish Survey by month and area fished, before adjustment for off-frame effort by unregistered anglers. State = trips taken in inland or state territorial seas, and EEZ = trips taken in federal waters of the Exclusive Economic Zone.

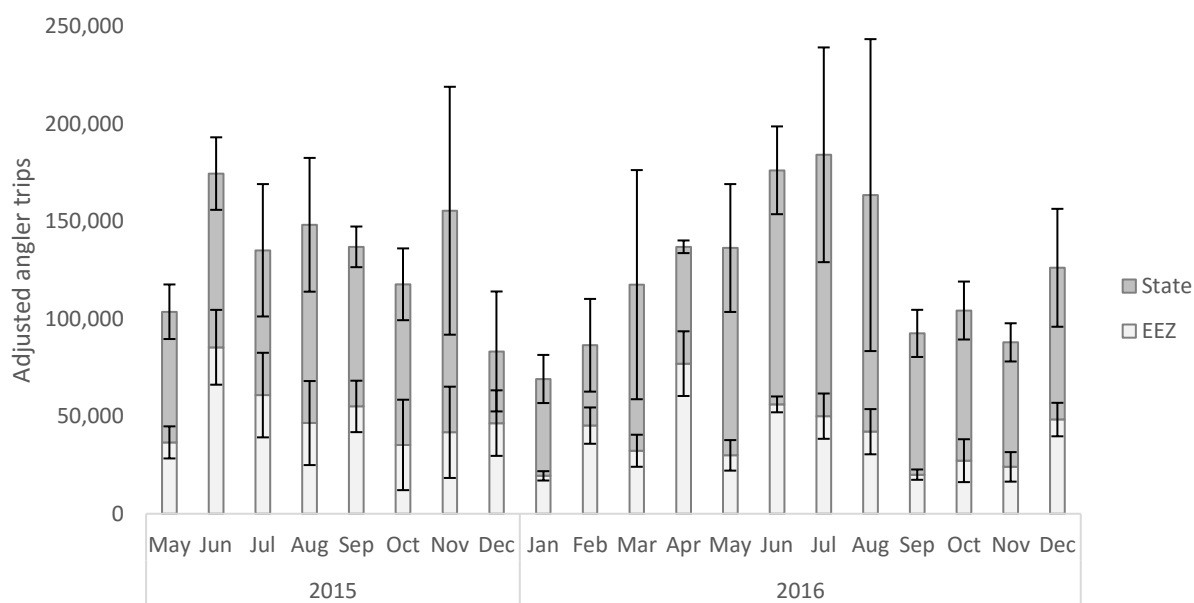


Figure 7. Estimated numbers of reef fish trips, adjusted for off-frame effort by unregistered anglers. State = trips taken in inland or state territorial seas, and EEZ = trips taken in federal waters of the Exclusive Economic Zone.

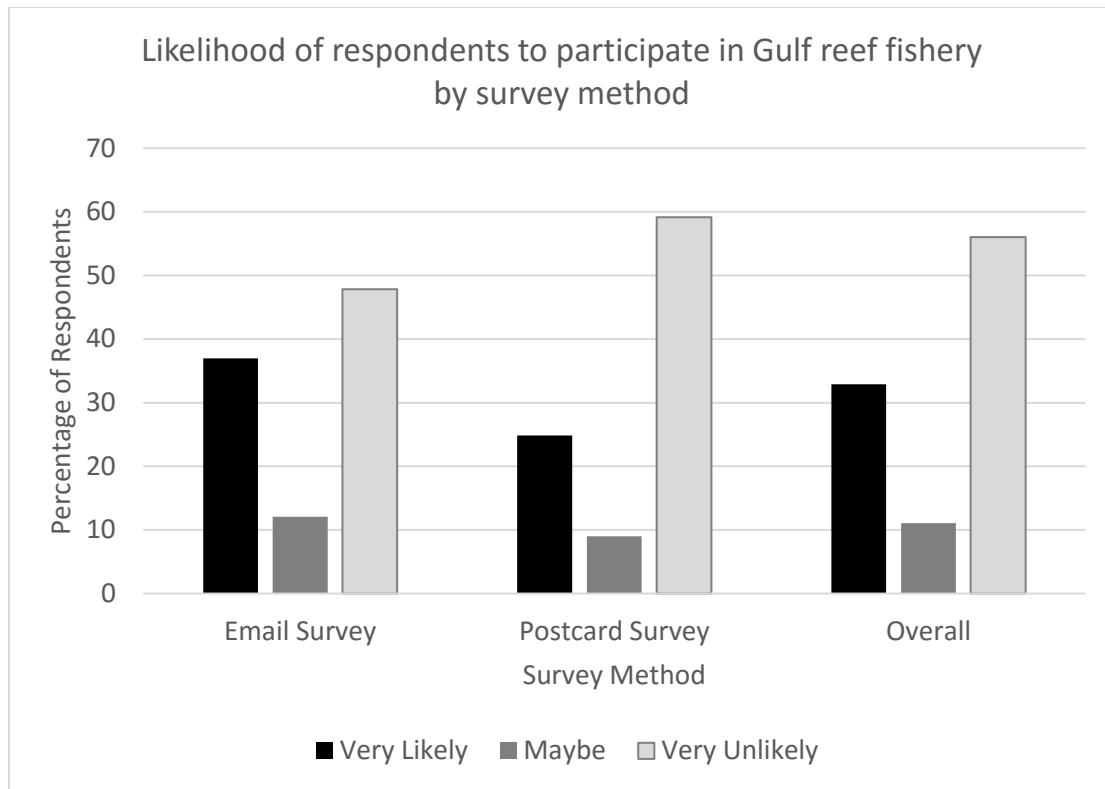


Figure 8. Percentage of new GRFS subscribers who responded to the avidity survey, by survey method, that were classified as either likely, somewhat likely, or unlikely to participate in a Gulf reef fish trip in the next 12 months.

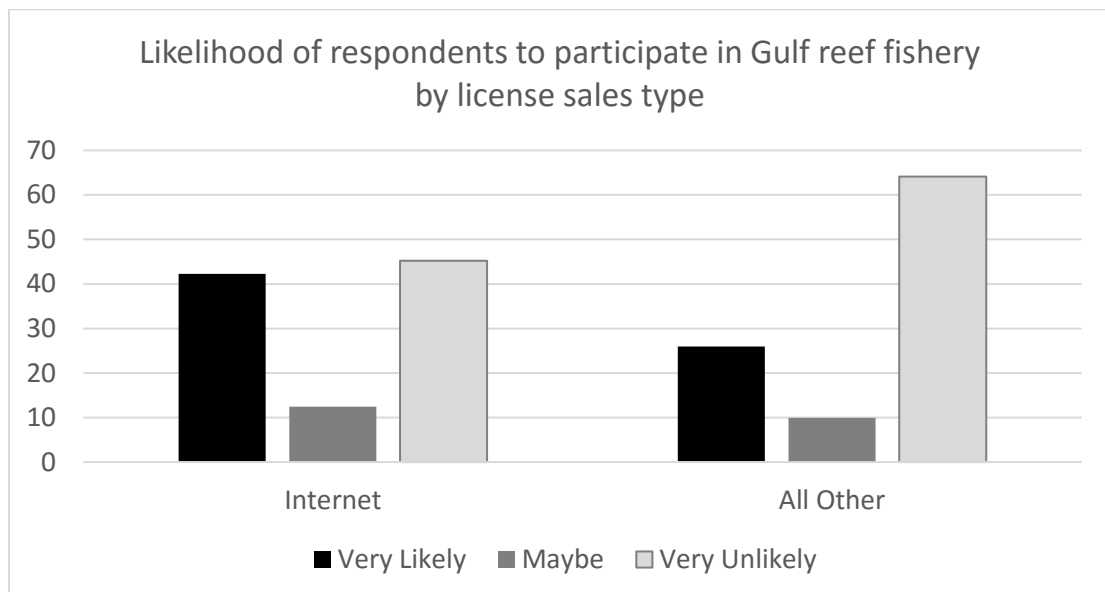


Figure 9. Percentage of new GRFS subscribers who responded to the avidity survey, by sign-up method

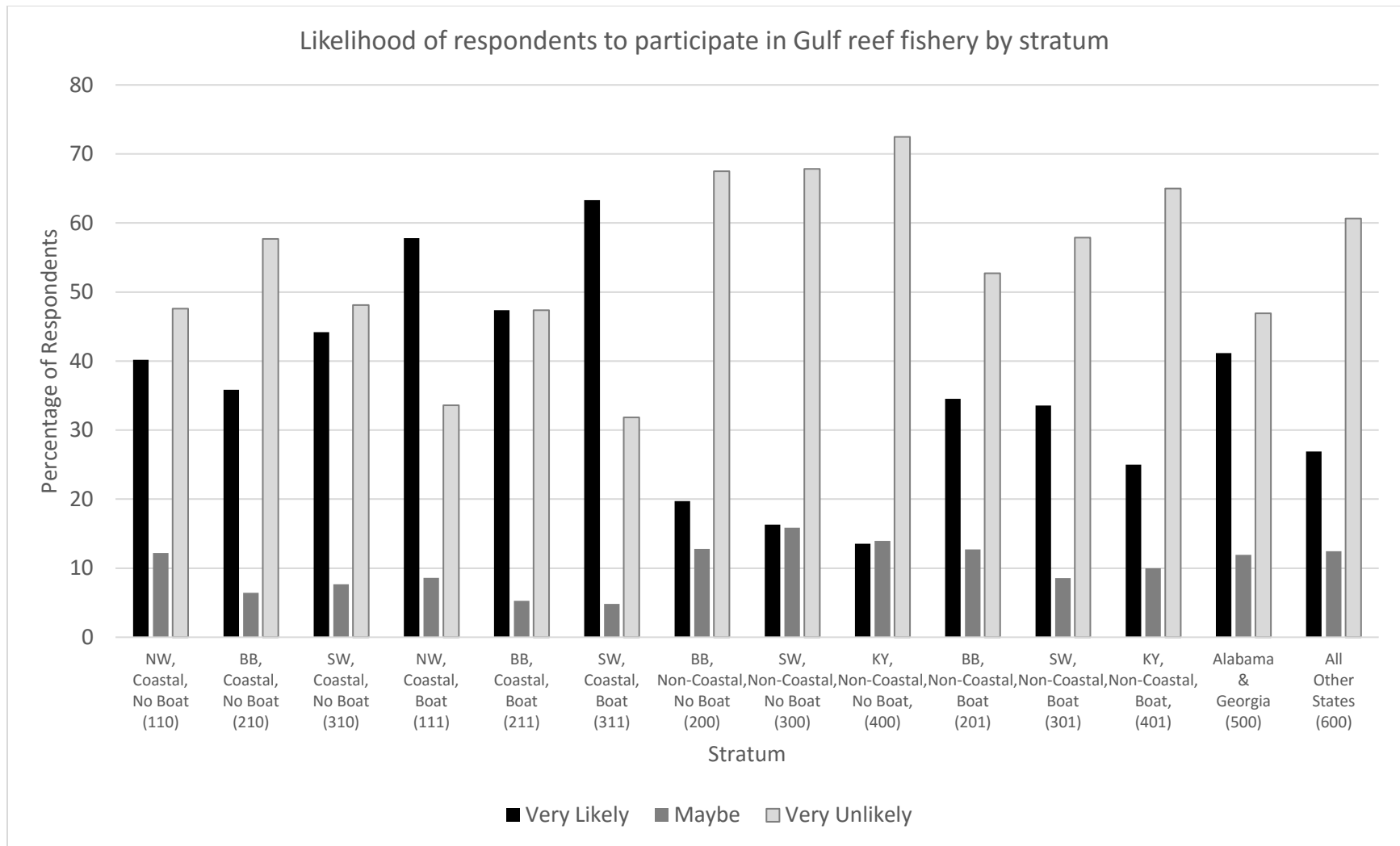


Figure 10. Percentage of new GRFS subscribers who responded to the avidity survey, by stratum, that were classified as either likely, somewhat likely, or unlikely to participate in a Gulf Reef Fish Trip in the next 12 month